

WHAT IS CLAIMED IS:

1. An isolated and purified DNA molecule which encodes human papillomavirus type 18 or a functional derivative thereof.
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2. The isolated and purified DNA molecule of Claim 1 selected from the nucleotide sequence shown in Figure 1, the nucleotide sequence shown in Figure 3, a functional derivative of the nucleotide sequence shown in Figure 1, and a functional derivative of the nucleotide sequence shown in Figure 3.
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3. An expression vector for expression of the DNA molecule of Claim 1 in a host.
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4. An essentially purified protein encoded by the DNA molecule of Claim 1.
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5. An antibody immunologically reactive with the a compound selected from the DNA molecule of Claim 1, RNA complementary to the DNA molecule of Claim 1 or a protein encoded by the DNA molecule of Claim 1.
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6. A process for expression of a human papillomavirus type 18 protein in a host, comprising:
- (a) transferring the expression vector of Claim 4 into a suitable host, and
- (b) culturing the host of step (a) under conditions which allow expression of the human papillomavirus type 18 protein from the expression vector.
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7. The process of Claim 6 wherein the protein is selected from HPV18 L1 protein, HPV18 L2 protein and combinations thereof.

5 8. A composition capable of inducing an immune response in a subject treated with the composition, the composition containing a compound selected from the DNA molecule of Claim 1, peptides encoded by the DNA molecule of Claim 1, RNA complementary to the DNA molecule of Claim 1, or combinations thereof.

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9. A vaccine for the prevention or treatment of human papillomavirus infection, the vaccine containing a compound selected from the group consisting of the DNA molecule of Claim 1, peptides encoded by the DNA molecule of Claim 1, RNA complementary to the DNA molecule of Claim 1, or combinations thereof.

15 10. A method for inducing immune responses against infection or disease caused by human papillomavirus which comprises introducing into an animal the DNA molecule of Claim 1, RNA complementary to the DNA molecule of Claim 1, protein encoded by the DNA molecule of Claim 1, or combinations thereof.

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25 11. Virus-like particles comprised of recombinant L1 protein or recombinant L1 + L2 proteins of human papillomavirus 18, the virus-like particles being at least 60% pure.

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12. The virus-like particles of Claim 11 wherein the recombinant L1 protein or the recombinant L1 + L2 proteins is produced in yeast.

13. A method of producing the virus-like particles of Claim 11, comprising:

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- (a) transforming yeast with a recombinant DNA molecule encoding papillomavirus L1 protein or papillomavirus L2 protein or papillomavirus L1 + L2 proteins;
  - (b) cultivating the transformed yeast under conditions that permit expression of the recombinant DNA molecule to produce the recombinant papillomavirus protein; and
  - (c) isolating the recombinant papillomavirus protein to produce virus-like particles of Claim 1.

14. Recombinant papillomavirus protein produced by the method of Claim 13.

15 11. 15. A vaccine comprising the virus-like particles of Claim

20 16. Pharmaceutical compositions comprising the virus-like particles of Claim 11.

25 17. A method of preventing papillomavirus infection comprising administering the vaccine of Claim 15 to a host.

18. A method for producing a yeast-derived recombinant papillomavirus capsid protein assembled into a virus-like particle,

comprising:

- a) cloning a papillomavirus gene that codes for at least one papillomavirus capsid protein into a vector;
- b) transferring the vector into a host cell to produce a recombinant host cell;
- c) cultivating the recombinant host cell under conditions that permit production of papillomavirus capsid protein; and

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- d) purifying the papillomavirus capsid protein under conditions that permit formation of a virus-like particle.

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Claim 18.

19. Virus-like particles produced by the method of

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20. A method for inducing an immune response in an animal comprising administering the virus-like particles of Claim 11 to an animal.

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